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AN ANSWER TO DR. GOULD.

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OF NEW YORK.



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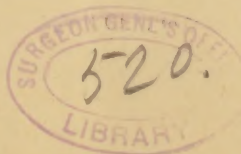
THE TREATMENT OF HETEROPHORIA—AN ANSWER TO DR. GOULD.

BY ALEXANDER DUANE, M. D.,
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DR. Gould in the January number of the ANNALS calls attention anew to his innervational theory of heterophoria, and to a method of treatment which he regards as new and which he seems to consider universally applicable. The paper, while of value in bringing into notice once more a method which has doubtless been too much neglected, proceeds upon what appear to me such erroneous assumptions, that I have ventured to take up the space of the ANNALS in a consideration of some of the points involved.

In the first place Dr. Gould's method of treatment is by no means new. I myself have employed it for eight years, and when I began using it did not think of calling it new, for I was well aware that it had been known and practiced for many years before that—notably by Dr. Stevens from whom I learned it. I have employed it, continuously with more or less success ever since, without, however, being led to ascribe to it the great value that Dr. Gould gives it. I have heard other ophthalmologists speak of it and supposed that it was the common property of the profession, and was therefore quite surprised to see it brought forward as something novel.

This, however, is a matter of very trifling moment. The real question at issue is whether Dr. Gould's theory is correct, and if the claims that he makes for his method of treatment are valid, for if so all our ways of dealing with heterophoria (and for that matter with squint as well), will have to be revolutionized. It becomes us therefore to examine the arguments upon which he bases his theory. These are as follows:



“(a) In convergence-adduction, the muscles overcoming the maximum prisms, bases out, that is possible, either internal rectus may be made to greatly increase its contractile power by simply carrying the object to the left or the right side of the field.

“(b) Extreme adduction (twenty feet) of exophoric eyes may be doubled, often trebled, in a minute or two by the device of slowly carrying the object gazed at, with weighted convergence-stimulus from the near to the distant point. If, as I said, one can lift with his arms only 200 pounds, one cannot lift 400 or 600 pounds in a minute by any analogous change of the method of lifting.

“(c) The extreme of primary adduction-power, and even the double of this extreme, may be held for several minutes, even half hour or more—I don’t know how much longer. The extreme lift of other bodily muscles can only be held an instant, and not only this, but constant and uninterrupted tension or contraction of such muscles in lifting even very small weights is impossible.¹

“(d) Besides all this, such constant tension, when solely muscular, is painful, even agonizing, if demanded by the will or by necessity. In the case of exophoria, the extreme of prisms, and even the double of the extreme, bases out, that can at first be held without diplopia, is in a minute or two continuously held without the faintest suggestion of pain or even of discomfort.

“(e) Muscular tissue, as such, cannot be made to double or treble its volume or its strength in a few hours or days, or even in a few weeks, but such increase of ocular adduction-power I see many times every day.”

These arguments present some facts very familiar already to ophthalmologists, although they do not, I think, substantiate the thesis which Dr. Gould would base upon them. They do prove that the initial maximum of convergence, as measured by the degree of prism, base out, which a patient can overcome on the

¹ The statements contained in this and the following paragraph are only partially true if they mean that the adduction can be exercised up to an indefinite point without fatigue and that the exercise can be carried on indefinitely without causing distress. As a matter of fact, as soon as we push the use of prisms beyond 25° (representing only 13° of convergence, or less than one-fourth of the maximum that the patient can do), a sense of strain is apparent, and the effort cannot, as a rule, be kept up more than a few minutes. In this regard the internal recti are not essentially different from the other muscles of the body. With all of them the principle holds that they are capable of sustaining a continuous exertion only when that exertion represents a fraction of the total power of the muscle engaged and when the movement performed is an habitual one or one that has been made habitual by constant practice.

first trial, falls far short of the total power of convergence which the interni can be made to exert; but this most of us have known for a long time. No one, in fact, who is acquainted with the subject supposes that because a patient fails to overcome the diplopia produced by a prism of 15° , placed base out, this figure represents the actual degree of convergence of which he is capable. The very fact that he can converge through a much greater angle in looking at near points would alone disprove this. And hence the fact that he can suddenly double or treble his initial (apparent) maximum of convergence simply proves that the power was there all the time and that the facility to apply that power was lacking.

As a matter of fact, the reason why we so readily learn to perform adduction at a distance and can maintain the effort so long without fatigue is because it is a movement that we have been carrying on all our lives at near points in reading, writing, and doing all other kinds of close work; and the reason why we find any difficulty at all in doing it at first is that we have not been accustomed to performing the movement in that way, and have not, we may say, the knack of it. We are in the position of a skillful tennis-player who, obliged to forego the use of his right hand, tries to play with his left. His strokes at first are uncertain and ridiculously feeble; the straight drives that he executed with his right hand are replaced by futile pushes; and yet the strength of the left arm fully equals that of the right, and all that is lacking is the directive power.

It is readily conceded therefore that defective convergence is innervational in character, *i. e.*, it is due to lack of the proper nervous impulse, and its existence simply means that in this particular respect the patient's co-ordination is defective, and that he does not know how to use the power that he is already amply endowed with. But this fact, although restated with much force by Dr. Gould is by no means new; and what is more to the purpose, we are not at all justified in deducing from it the inference that he has made, *i. e.*, we cannot say that because deficiency in convergence is due to a failure of innervation, the exophoria which may be associated with it is also necessarily due to the same cause. This, to be sure, would follow if we admitted that the exophoria was the result of the failure to converge, but Dr. Gould really adduces no arguments to prove this, except that as the result of exercising the convergence the exophoria disappears. This fact, however, is quite susceptible of another explanation, and, on the other hand, there are facts which show that the exophoria is not in

all cases, or even in the majority of them, due to any anomaly of convergence-innervation.

In the first place, if this theory were universally true, all patients with exophoria should have deficient, and all patients with esophoria excessive primary adduction power. This is far from being the case. Many patients with exophoria can at once overcome prisms of 20° and 30° or more, while in esophoria it is sometimes the case that the primary converging power for a distance is defective, so that such patients can scarcely overcome 10° or 12° at first.²

Again, if Dr. Gould's innervational theory is correct, cases of esophoria ought to yield uniformly to exercise of the abduction conducted by placing prisms, base in, before the eyes; and, indeed he speaks as if this had been his experience in this class of cases. He admits, however, that the instances of esophoria and of hyperphoria that he has met with have been few³ and the

² Thus in forty-two cases of exophoria in which I determined the convergence capacity, fifteen had normal power to start with, and twenty-seven defective convergence. But, as a matter of fact, the discrepancy in number between the cases with normal and those with defective power is not as great as these figures would imply, for of the twenty-seven with low converging power only four were cases of simple exophoria, the rest being cases of transition between exophoria and squint, (*i. e.*, those in which the divergence was so great that the patient was no longer making any effort to converge), or cases complicated either with hyperphoria or with a paretic condition of the superior or inferior rectus.

³ To anyone who has done much work in connection with muscular anomalies it will seem strange that Dr. Gould should speak of the cases of esophoria and hyperphoria as being infrequent. In the practice of other ophthalmologists they are found with considerable frequency, esophoria being present in about the same proportion as exophoria, and hyperphoria being more frequent than either. Thus in 208 consecutive cases which I examined I found

Esophoria.....	39
Exophoria	43
Hyperphoria { simple	14
{ combined with esophoria.....	38
{ combined with exophoria.....	37
Mixed conditions, (<i>i. e.</i> , esophoria alternating under certain conditions with a divergent strabismus, or a state in which insufficiency of both superior and inferior recti balancing each other, produced orthophoria in the primary position).....	7
Uncertain or variable.....	8
Orthophoria.....	25
Total.....	208

results which he has attained with them have been inconclusive. My own experience extending over eight years, in which this very method has been tried in this particular kind of heterophoria over and over again in a great number of cases, has convinced me that in the vast majority it is totally inefficacious, the esophoria remaining precisely the same after repeated careful exercise of the abduction. Nor is the latter susceptible of being trained like the adduction. Given a primary abduction of 5° , this remains unchanged in spite of the most strenuous efforts of doctor and patient until a tenotomy is performed and then it mounts *pari passu* with the diminution effected in the esophoria by the operation. In fact, the only cases in which training of the abduction has seemed to me efficacious are those which have been subjected to a tenotomy and in which the tendon, as a result of its division, is left free to attach itself as it will. Here a judicious exercise of the abduction directly after the operation may serve to displace the point of attachment of the severed tendon and by causing its reattachment further back may diminish the esophoria.

Nor does the fact that an exophoria is relieved by exercising the interni prove that the condition is necessarily due to faulty innervation of the latter. In several cases of exophoria which I have treated with fair success in this manner the cause of the divergence was clearly shown to be a paresis of either the superior or inferior rectus—this condition producing a relative divergence of the eyes not because there was innervational incapacity to converge, *i. e.*, any lack of co-ordination, but because one of the adductors of the eye (superior or inferior rectus), was weakened. The weakening in these cases may be and apparently was a rule mechanical, *i. e.*, consisted in a feebleness of the muscular fiber itself, probably dating from birth and due to nondevelopment.⁴

Nor is it always the case that the exophoria is abrogated by training the adduction in the way that Dr. Gould has described. In fact, in rather more than half the cases in which I have employed the method, (and, as before mentioned, I have been

Or, taking the 200 cases in which the diagnosis was assured, those of esophoria formed 19.5 per cent (37.0 if we include the cases of hyperesophoria), those of exophoria 21.5, (40.0 including the cases of hyperexophoria), and hyperphoria 43.0, (including 7.0 of hyperphoria uncomplicated by either esophoria or exophoria).

⁴See for full discussion of these cases a paper read by the author before the New York Academy of Medicine and printed in the *Archives of Ophthalmology* for April 1894. I will here add only to the statements there made the fact that I have observed several of additional cases since.

employing it for years), the exophoria was not relieved, although the adduction was carefully and persistently exercised until the patient could overcome prisms of even 50° or 60° , bases out. A transitory reduction of the exophoria, to be sure, is the regular result of training the adduction; but cases in which an abolition of the ~~faculty~~ tendency lasting for any length of time is effected are by no means so frequent.

faulty

The fact is that there is no single cureall for exophoria or for any other muscular anomaly. Some cases yield to training of the muscles; some (although comparatively few), to correction of the refractive error; some to tenotomy; and some, we must reluctantly admit, are incorrigible. It will no more do to apply one method of treatment to the relief of all cases than to apply any one method for the cure of dropsy. In the one case as in the other we must first ascertain the nature and cause of the underlying pathological condition, and then apply the method of treatment that is adapted to the state found. If, as sometimes happens in hypermetropia, we have a heterophoria due to an excess of accommodative effort, we shall overcome it by the use of the appropriate convex glasses. If there is a deviation associated with a deficiency of accommodative effort, we may relieve it by exercising the adduction in the way that Dr. Gould and many others before him have done. If we have a concomitant heterophoria (and we can diagnose a concomitant heterophoria just as well as we can a concomitant squint), we shall in general remedy the defect only by a tenotomy. If we find that we are dealing with a paretic heterophoria,⁵ our treatment will vary widely according to the cause underlying the paresis and the gravity of the effects which it produces. And so in any case, I hold that we are no longer justified in treating exophoria simply as such or hyperphoria as such, but must first find what the exophoria or hyperphoria means; must find, that is, whether it is spasm or paresis, accommodative strain or anatomical conditions that are the cause of the heterophoria; and having found this to apply then the appropriate remedy.

This subject of the treatment of heterophoria in general, however, opens up too wide a field for discussion here, and I will merely call attention to the class of cases in which I believe that

⁵ Cases of this sort are more frequent than is usually supposed. Thus out of 295 consecutive cases of muscular trouble of all sorts recorded in my case-books, sixty-two, or 21 per cent, were instances of paretic squint or of a heterophoria produced by paresis of one of the elevator or depressor muscles; and of 269 persons examined for muscular anomalies fifty-six, or 21 per cent were affected with paretic heterophoria.

exercise of the convergence is indicated. It seems to me that they are for the most part, if not altogether, limited to those cases in which from some cause or other the patient is unable to disassociate his convergence and accommodation. That is, he cannot converge, even to a slight degree, without also accommodating, and hence he finds difficulty in overcoming prisms, base out, at a distance, because in looking at a distant object he cannot employ his accommodation and at the same time see distinctly. When we first practice the convergence in such a patient, we find that at first he can scarcely overcome a prism of 10° , base out. When finally we have succeeded in getting him to overcome prisms of 15° or 20° , we discover that his vision with these glasses is only $\frac{20}{40}$ or $\frac{20}{50}$, but immediately becomes $\frac{20}{20}$ on adding, say a — 1.50 D. spherical. Now if we keep up the practice for a day or two more, we soon find that he can be got to overcome prisms of 20° , 30° or more; and, although at first he sees badly with these glasses, showing that he is still using his accommodation when converging, the time comes when even with these strong prisms he gets a vision of $\frac{20}{20}$. We have now succeeded in divorcing his accommodation and convergence, so that the latter can be called into play at will without necessarily involving the former. When this has taken place we frequently find that the exophoria and the symptoms of which it is the cause have diminished or disappeared altogether. The reason is plain. The patient has now learned to converge, *i. e.*, to use his interni efficiently in overcoming his exophoria, without at the same time using any excess of accommodation in the effort, and hence he can see distinctly and yet at the same time fix properly with both eyes. That is, the exophoria or tendency to deviate may still be present, but we have shown the patient how to use his interni so as to overcome it all the time, and that moreover with facility and without interfering with his vision. The amount of actual muscular effort implied in this is not so great but that the patient can exert it continuously, and once the facility is acquired, he has no more trouble in exerting this effort than a person with 12 D. of available accommodation has in overcoming a hypermetropia of 0.50 D. The power to do this was there all the time but the patient's ability to use it was hampered by his inability to exert this power without at the same time using his accommodation. As soon as we have taught him how to employ one without calling the other into play, he will be able to converge as well as anybody and to overcome his exophoria with ease.

A careful study of the cases in which training of the adduction has sufficed to overcome the exophoria will, I believe, demonstrate that the efficacy of the treatment is explainable upon the principle laid down in the foregoing paragraph, and the same principle defines the limitations of a method which, though very serviceable, is far from being of universal application.

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